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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,201	04/09/2004	My The Doan	IME03-008	2370

7590 04/18/2006  
George O. Saile & Associates  
28 Davis Avenue  
Poughkeepsie, NY 12603

EXAMINER

ROJAS, OMAR R

ART UNIT PAPER NUMBER

2874

DATE MAILED: 04/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/822,201

Applicant(s)

DOAN, MY THE

Examiner

Omar Rojas

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-53 is/are pending in the application.
- 4a) Of the above claim(s) 13-23, 26-30, 40-48 and 51-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 5-8, 31 and 35-37 is/are rejected.
- 7) ☒ Claim(s) 2-4, 9-12, 24, 25, 32-34, 38, 39, 49, and 50 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 0604.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: Detailed Action.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of Group a.), the species of Figures 1-7, in the reply filed on February 16, 2006 is acknowledged. The traversal is on the ground(s) that Applicant would be forced to bear increased costs and "the field of search must necessarily cover all species, in addition to other related Classes and subclasses, to provide a complete and adequate search." This is not found persuasive because Applicant has chosen to file the patent application with at least 5 different embodiments corresponding to the different claimed species. A complete prior art search of all these species is considered burdensome because, in the Examiner's opinion, the different species are patentably distinct.

The requirement is still deemed proper and is therefore made FINAL.

### ***Information Disclosure Statement***

2. The prior art documents submitted by Applicant(s) in the Information Disclosure Statement(s) ("IDS") filed on June 21, 2004 have all been considered and made of record (note the attached copy of form(s) PTO-1449).

### ***Specification***

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 2874

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**5. Claims 1, 5-8, 31, 35, and 36 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Patent No. US 6,741,778 B2 to Chan et al. (“Chan”).**

*In re* claim 1, Chan teaches a method comprising:

providing an optical substrate 12 comprising at least one passive optical component 24 formed therein;

providing an electronic substrate 30 comprising at least one active electronic component (32, 37, 39) formed therein;

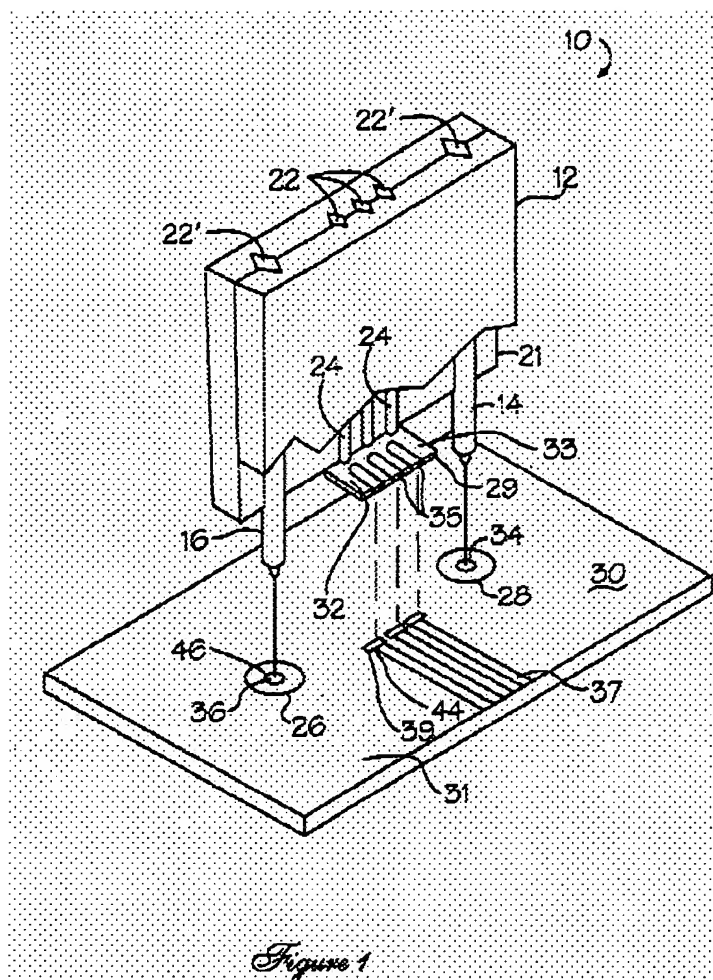
forming a plurality of metal pillars (14, 16) through said optical substrate 12 and protruding out a first surface of said optical substrate;

forming a plurality of metal pads (26, 28) on a first surface of said electronic substrate 30; and

bonding together said optical substrate 12 and said electronic substrate 30 by a method further comprising:

aligning said first surfaces of said optical and electronic substrates such that said protruding metal pillars (14, 16) contact said metal pads (26, 28); and

thermally treating said optical and electronic substrates such that said metal pillars (14, 16) bond to said metal pads (14, 16). See also col. 4, lines 6-30. Figure 1 of Chan is reproduced below.



*In re* claim 5, said passive optical component 24 is an optical fiber (i.e., a waveguide).

*In re claim 6*, said passive optical component 24 is an optical fiber (i.e., a waveguide) which are inherently made of silica.

*In re* claim 7, the active electronic component 32 inherently comprises some type of laser driver circuitry because it may include a laser (see col. 4, lines 35-38 and col. 1, lines 12-17).

Art Unit: 2874

*In re* claim 8, the soldering step disclosed by Chan (col. 4, lines 28-29) inherently involves using temperatures within the claimed range in order to melt and/or reflow the solder.

*In re* claims 31, 35, 36, the product as claimed is also clearly disclosed by Chan in view of the previous remarks concerning claims 1 and 5-7.

**6. Claims 1, 31, 35, and 37 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Patent No. US 6,935,792 B2 to Saia et al. ("Saia").**

*In re* claim 31, Saia discloses a heterogeneous system device, said device comprising:

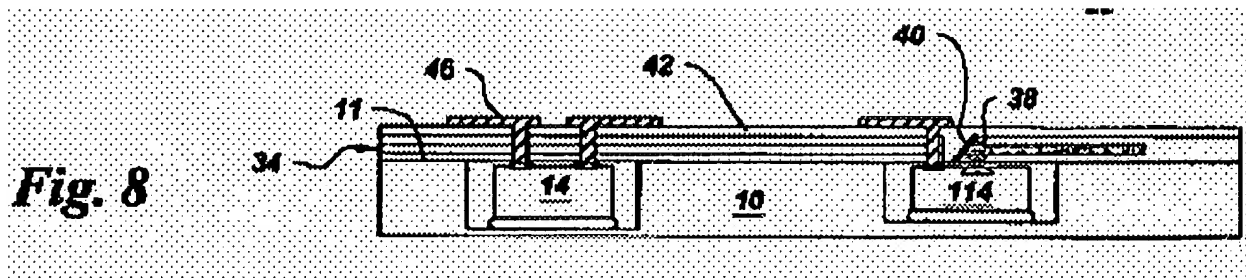
an optical substrate (34, 42) comprising:

at least one passive optical component 27 formed therein; and

a plurality of metal pillars 46 through said optical substrate and protruding out a first surface of said optical substrate;

and an electronic substrate 14 comprising at least one active electronic component formed therein;

and a plurality of metal pads 16 on a first surface of said electronic substrate 14 wherein said first surfaces of said optical substrate and said electronic substrate are held together by the bonding between said metal pillars 46 and said metal pads 16. Figure 8 of Saia is reproduced below.



In re claims 35 and 37, said passive optical component 27 comprises a waveguide and wherein said waveguide 27 further comprises an embedded mirror 38.

***Allowable Subject Matter***

7. Claims 2-4, 9-12, 24, 25, 32-34, 38, 39, 49, and 50 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 2, 3, 32, and 33, the primary reason for allowance of the claims is the inclusion of the optical substrate is a wafer comprising a plurality of die, wherein each die comprises at least one passive optical component and wherein the electronic substrate is a wafer comprising a plurality of die, and wherein each die comprises at least one active electronic component.

Regarding claim 9, the primary reason for allowance of the claims is the inclusion of the step of bonding together further comprises a pre-plasma surface treatment of the protruding metal pillars and the metal pads prior to the step of thermally treating. Regarding claims 10-12, the primary reason for allowance of the claims is the inclusion of the passive optical component comprises a waveguide and wherein the waveguide further comprises an embedded mirror. Regarding claims 24 and 25, the primary reason for allowance of the claims is the inclusion of all the additional

Art Unit: 2874

method steps recited by claim 24. Regarding claim 34, the primary reason for allowance of the claims is the inclusion of the electronic substrate comprises a photodetector device, wherein the optical substrate transmits an optical signal, and wherein a vertical waveguide transmits the optical signal through the electronic substrate to the photodetector device. Regarding claims 38 and 39, the primary reason for allowance of the claims is the inclusion of the electronic substrate comprises a vertical waveguide and a photodetector device such that an optical signal path is formed through the optical substrate waveguide, to the embedded mirror, through the electronic substrate vertical waveguide, and to the photodetector. Regarding claims 49 and 50, the primary reason for allowance of the claims is the inclusion of a third substrate comprising a plurality of metal pads on a first surface of the third substrate wherein a second surface of the optical substrate, opposite from the electronic substrate, and the first surface of the third substrate are held together by the bonding between the metal pillars and the third substrate metal pads.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Patent No. US 6,984,544 B2 discloses a method of connecting semiconductor dies using metal pillars and bonding pads.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Omar Rojas whose telephone number is (571) 272-2357. The examiner can normally be reached on Monday-Friday (12:00PM-8:00PM).

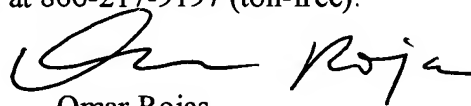
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rod Bovernick, can be reached on (571) 272-2344. The official facsimile number



Art Unit: 2874

for regular and After Final communications is (571) 273-8300. The examiner's RightFAX number is (571) 273-2357.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Omar Rojas  
Patent Examiner  
Art Unit 2874

or  
April 17, 2006



AKM ENAYET ULLAH  
PRIMARY EXAMINER